

WORKING PAPER

Consumer confidence's boom and bust in Latin America

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Abstract

We use a comprehensive methodology to characterize the confidence cycle features across a sample of LatAm economies. First, we compute various regime characteristics of consumer mood through a conventional univariate Markov-switching model and identify common ground for assessing confidence-cycle similarities among LatAm economies, while examining country lead and lag patterns during aggregate mood shifts. Second, we extend the analysis to a bivariate regime-switch model to deal with synchronisation measures for consumer mood across country pairs. Overall, our findings show that a core group, given by Argentina, Chile, Colombia and Mexico, tends to share a statistical common ground for both confidence boom and bust cycle synchronisation. Notably Argentina and Chile systematically tend to lead consumer mood shifts in the region. On average, these two countries seem to play a leading role in propagating the consumer confidence shocks throughout LatAm.

Key words: Confidence cycles, Latin American countries, cyclical synchronization.

JEL classification: E32, C22, E27.

[†] We are grateful to Juan Ruiz and Julian Cubero from BBVA Research for their comments, which have greatly improved the quality of the paper. M. Camacho acknowledges support from projects ECO2016-76178-P and 19884/GERM/15 (Groups of Excellence, Fundación Séneca, and Science and Technology Agency). We are responsible for any remaining errors.

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1. Introduction

Animal spirits is the term Keynes (1936) used to describe the instincts, proclivities and emotions that influence human behaviour. Although instincts are not directly observable, they can be measured in terms of, for example, consumer confidence. As economic agents, consumers are expected to be influenced by the business cycle. During expansions, the economy is growing in real terms, as evidenced by increases in indicators like employment, industrial production, sales and personal incomes. Therefore, within expansions, consumers spend money, which indicates both a healthy economy and a boost in consumer confidence. However, during recessions, the economy is contracting, as may be measured by both depressed macroeconomic indicators and a downturn in consumer confidence.

Given that consumer confidence is only partially observable, our analysis relies on indices. These indicators are typically constructed from household surveys of consumer opinions that weight both current conditions and future economic expectations. Therefore, they potentially contain subjective information relevant to consumer choices, such as belief in certain economic prospects, which might not be revealed in conventional economic indicators.

This paper examines the potential cyclical behaviour in the degree of optimism of consumers —measured by confidence indices— over the state of the economy. In a context of both increasing globalisation and tendencies towards market liberalisation policies, what concerns us here is evaluating whether the dynamics of the consumer confidence cycles have become more similar across the Latin American (LatAm) countries. For completeness, our focus is not only the analysis of confidence synchronisation across countries, but also the evolution of other features of the confidence boom and bust cycle, such as duration, deepness and persistence.

Following Hamilton (1989), we assume that the dynamics of the consumer confidence indicators follow a regime switch process, and that the switching mechanism at each time is controlled by an unobservable state variable, which is allowed to follow a first-order Markov chain. This approach has been followed by Batchelor & Dua (1997) to show that switching points in the overall US consumer confidence index provided by the Conference Board consistently lead switching points in the US coincident indicator.¹

The analysis of synchronization across LatAm confidence cycles follows the lines suggested by Leiva-Leon (2017) and Camacho & Leiva-Leon (2017). In a nutshell, the synchronisation of two national confidence cycles —in a pairwise comparison— is viewed as a time-varying combination of two extreme cases: the first with two independent Markov processes, which indicates the possibility of a regime with completely independent cycles, and a second one with a unique Markov process which is shared by both countries' households, which suggests a perfect synchronisation regime. The non-linear process that allows the shifts between these two extreme regimes is governed by the outcome of an unobserved Markov chain, whose filtered probability of the perfect synchronisation state indicates the degree of household mood synchronisation of a pair of countries.

1: Among others, Markov-switching models used confidence indices in Cevik, Korkmaz, & Atukeren (2012), Chung, Hung, & Yeh (2012), Jackson, Owyang, & Soques (2016), and Ayben & Murat (2017).

Within this framework, we examine the cyclical dynamics of LatAm's consumer confidences by using monthly data from consumer confidence indices for Argentina, Brazil, Chile, Colombia, Mexico, and Peru from 1981 to 2017. With respect to the confidence cycle characteristics —duration, deepness and persistence— we find that Argentina, Chile, and Mexico exhibited similar features. However Peru and Brazil, and, to a lesser extent Colombia, showed a higher predominance of idiosyncratic features.

Regarding the analysis of confidence regime synchronisation, we find that Argentina and Chile tend to lead consumer mood shifts in the region, while Colombia tends to exhibit a lagging pattern. In addition, we find that the overall evolution of averaged pairwise measures of synchronisation between countries is relatively stable throughout the sample period, although this average does hide a high degree of heterogeneity. Finally, Brazil and Peru are the countries with the most independent confidence cycle patterns. Meanwhile, the cornerstone of this work posits Argentina and Chile as the countries with the most frequent and consistently leading behaviour in the transmission of the consumer confidence shocks across LatAm, although we do not model and identify the spill-over's transmission channel.

The remainder of this paper is organized as follows. Sections 2 and 3 describe the data and analyse the results from the univariate Markov-switching model. While Section 2 focuses on business cycle characteristics —duration, deepness and persistence—, Section 3 assesses which countries lead and which ones lag the confidence regime shifts in LatAm. Section 4 describes the framework used to compute inferences on the international evolution of the consumer confidence cycle. Section 5 then concludes.

2. Consumer confidence characteristics

We used monthly data of overall consumer confidence indices for Argentina, Brazil, Chile, Colombia, Mexico and Peru. Table 1 shows the variables used in the analysis and the effective sample periods per country. Simple inspection of this table shows the high degree of heterogeneity in the way the indices are constructed across countries. According to the time series plotted in Figure A1 of the Appendix, although the indices fluctuate around an average of about 50 in Argentina, Chile and Peru, the sample average of the index falls to about 14 in Colombia and about 40 in Mexico, while it surges to 120 in Brazil. This heterogeneity complicates the international comparative analysis of the raw data.

Thus, to extract some features of the confidence cycles, we characterize the stochastic processes of mood indicators —which are reasonably thought of as stationary— as being generated by two possibly different distributions. One distribution refers to a normal or buoyant consumer mood, while the other distribution characterizes the periods of low or depressed spirits. Although the actual regime of the consumer confidence is unobservable, we assume that the transitions between states can be modelled as a hidden Markov process. In this way, the recovered low-regime probability can be used to date turning points or to assess dates at which the state of consumer mood faces a regime change.

In particular, let us assume that the dynamics of the time series follow a regime switch, and that the switching mechanism of the consumer confidence index of country a at time t , y_{at} , is controlled by an unobservable state variable, s_{at} , which follows a first-order Markov chain. Following Hamilton (1989), a simple switching model may be specified as

$$y_{at} = c_{s_{at}} + \sum_{j=1}^p \alpha_{aj} y_{at-j} + \varepsilon_{at} \quad (1)$$

where $\varepsilon_{at} \sim iidN(0, \sigma_a^2)$.²

The non-linear behaviour of the time series is governed by $c_{s_{at}}$, which is allowed to change within each of the two distinct regimes, $s_{at} = 0$ and $s_{at} = 1$. Thus, assuming $c_{a0} > c_{a1}$ identifies $s_{at} = 0$ as the high-confidence regime and $s_{at} = 1$ as the low-confidence regime.

The Markov-switching assumption implies that the transition probabilities are independent of the information set at $t - 1$, χ_{at-1} , and of the regimes prior to $t - 1$. Accordingly, the probability of remaining in one particular state is

$$p(s_{at} = i / s_{at-1} = j, s_{at-2} = h, \dots, \chi_{at-1}) = p(s_{at} = i / s_{at-1} = j) = p_{aij} \quad (2)$$

where $\chi_{at-1} = y_{a1}, y_{a2}, \dots, y_{at}$.

The middle panel in Table 1 reports the maximum likelihood estimates of the model's parameters, when the time series are the monthly consumer confidence indicators for Argentina, Brazil, Chile, Colombia, Mexico and Peru. For each country a , the estimate of c_{a0} is greater than the sample average, while the estimate of c_{a1} is lower than the sample average. Hence, we can associate the first regime with periods of high confidence and the second regime with periods of low confidence.

Consider some of the properties of the estimated Markov-switching model. Each regime is highly persistent, with estimated probabilities of a regime being followed by the same regime above 0.9. According to the estimated transition probabilities, the economies tend to spend on average about 56 percent of the time in the high-confidence phase and about 52 percent of the time in the low-confidence phase.

In addition, one can derive the expected number of months that a cycle phase of the consumer confidence prevails as $(1 - p_{aii})^{-1}$. The corresponding estimates are reported in the bottom panel of Table 1. Conditional on being in a pessimistic state, the expected duration of a typical low-confidence regime is a bit lower than 30 months in Argentina, Colombia and Peru, about 60-75 months in Chile and Mexico, and much longer, at about 160 months, in Brazil. Likewise, conditional on being in the optimistic regime, the expected duration of this state is similar to the case of the low-confidence regime for Argentina and Chile —evidence of duration symmetry—, while it is much shorter for the case of Brazil and Mexico, and longer in the case of Colombia and Peru.

In the Appendix, Figure A1 displays the confidence indices and the full-sample smoothed probabilities of the pessimistic state, $p(s_{at} = 1 | \chi_{at})$, along with the 95% confidence intervals —following Alvarez et al. (2017)— for each country. While the indices fluctuate around their respective means, the broad changes of direction in the series seem to mark the two different regimes in the consumers' attitudes about current and future economic conditions quite well. In

²: According to Camacho and Perez-Quiros (2007), we did not include lags in the Markov-switching specification and we also assume a state-independent variance. We checked that the resulting model is dynamically complete in the sense that the errors are white noise.

particular, the figure shows that the specific inferences about the historical incidence of confidence states generated by the smoothed probabilities correspond closely to periods for which the confidence index scores below 50 in the case of Argentina, Chile and Peru, below 100 in the case of Brazil, below zero in the case of Colombia, and below 40 in the case of Mexico, in all of these cases indicating a lack of optimism. Moreover, where confidence indices move towards their respective thresholds, or overall average, this does not mean that a regime change has necessarily occurred. For example, in the case of Chile, to state that consumers are in a pessimistic regime, the model criterion is more demanding than the simple observation of an index level below 50 points.

Therefore, the smoothed probabilities can be used as an objective algorithm for dating the phase changes between the low-confidence and the high-confidence regimes. A natural metric might be based on whether the pessimistic regime is more likely than the optimistic one, which occurs whenever the smoothed probability is above 0.5. Following this metric, Table 1 shows that Argentina and Chile, followed by Colombia, exhibit more phase changes than Mexico and Peru, and particularly more than Brazil, for which the phase changes are much less frequent. So although the optimistic and pessimistic mood seem to alternate more frequently in Argentina, Chile and Colombia, both regimes are very long-lived and less frequent in Brazil, which seems to have been in a depressed environment from early 2014. Another interesting case is Peru, whose movements in consumer confidence are quite smooth, and which seems to have been in an optimistic regime from early 2009.

The last measure reported in the bottom panel of Table 1 is the deepness of the consumer confidence cycle, measured as the percentage of the difference across regimes over the expected value of the index in the high-confidence regime. The highest deepness appears in Colombia (109%), followed by Chile (55%). Then, Argentina (22%), Peru (24%) and Brazil (29%) show similar deepness of confidence across regimes, while Mexico exhibits the lowest deepness (17%).

To summarize the results for the differences in consumer confidence characteristics across countries, we take a simple measure of dissimilarity by computing the Euclidean distance of mood cycle characteristics between each pair of countries. With the aim of avoiding redundant information, we focus on the following characteristics: (i) expected duration of both high and low consumer confidence states; (ii) frequency of both high and low consumer sentiment regimes; and (iii) deepness, as the percentage of the difference across the estimated within-regime means over the estimated mean in the high-confidence regime.

That is, letting $x_{i,j}$ denote the i th characteristic of country j , the distance or degree of dissimilarity of confidence cycle characteristics between countries a and b is defined as

$$d_{a,b} = \sqrt{\sum_{i=1}^h (x_{i,a} - x_{i,b})^2}, \quad (3)$$

where h is the total number of characteristics. From this metric, we obtain a set of 15 different distances. Then, in order to facilitate a visual inspection of the dissimilarities across countries, we follow Timm (2002) to plot the multi-dimensional scaling (MDS) maps.³ This map projects the pairwise distances on the consumer confidence cycle characteristics in a

3: In these maps, the dimension reduction is discretionary, while the axes are meaningless and the orientation of the picture (i.e. the pivot country) is arbitrary.

plane in such a way that the distances among the countries plotted approximate the consumer sentiment cycle dissimilarities. As a result, countries which present high confidence cycle dissimilarities are shown far away from each other in the plane. Therefore, the map is very useful to understand the consumer mood affiliation across the set of countries.

The MDS map of consumer confidence cycle characteristics is reported in Figure 1. Notably, Argentina, Chile, and Mexico seem to stick together in the map, reflecting that these countries form a core that shows closer similarities among features of consumer confidence cycle characteristics. These countries exhibited the most similar high and low mean regimes. For instance, Chile and Mexico showed closer expected duration in both regimes while the deepnesses for Argentina and Mexico are quite similar.

In addition, Colombia, Peru and Brazil are plotted further away from the core, which reflects the differences between their cycles' characteristics and those of the core. These countries also appear separate from each other, which indicates that their consumer confidence cycle characteristics exhibit more idiosyncratic patterns. In particular, Colombia shows the lowest mean in both regimes and the highest deepness; Peru, shows a large expected duration of the optimistic regime relative to its low mood expected duration; and Brazil shows the strongest idiosyncratic patterns, with the highest means in both states and the longest expected regime durations.

3. Country lead and lag patterns

The univariate Markov-switching method applied to each of the countries confidence indexes provides six different time series of low-confidence probabilities, which can be used to determine the geographically-disaggregated turning points.

A straightforward way to examine the evolution of the Latin American supranational low-confidence probability is by averaging the national probabilities. For this purpose, Figure 2 displays the averaged probability of low confidence regime, $\frac{1}{N} \sum_{a=1}^N p(s_{at} = 1 | \chi_{aT})$, from 1998.07 to 2017.02, where N is the number of countries in the sample.⁴ Using the 0.5 threshold, the figure shows that the LatAm confidence turning points are dated as follows: a trough from November 2003, a peak from April 2008, a trough from October 2009 and a peak from May 2014. We call it the LatAm reference consumer cycle.

Then we can identify the lead-lag national patterns by comparing the national turning points—that also come from the 0.5 threshold—with the LatAm reference consumer cycle. To summarise the results, Table 2 reports the lead and lag pattern as follows: a negative (positive) figure of m months implies that the country turning point lags (leads) the LatAm turning point by those m months. For example, the November 2003 LatAm exit from pessimism was led by Argentina in 6 months while it was lagged by Peru in 27 months and by Brazil in 10 months.

On average, the last column of the table suggests that, while Mexico, Peru, Colombia and Brazil tend to lag LatAm turning points, Argentina and, to a lesser extent Chile, dominate the phase changes with a significant lead. From looking across state averages, the findings show that the troughs are led only by Chile while they are lagged mostly by Mexico,

4: The average is computed using at least three countries from 1998.07

Peru and Brazil. By contrast, the peaks are only lagged by Colombia while they are led mostly by Argentina, Mexico and Chile.

4. Measures of synchronisation

4.1. The model

In this section, we use the bivariate Markov-switching model proposed by Leiva-Leon (2017) to obtain a full characterization of the regime inferences while assessing the type of synchronicity that the confidence indices exhibit at each period of time across pairs of countries.

Let y_{at} and y_{bt} be consumer confidence indices for any pair of countries a and b . The dynamics of these two indices are governed by two unobservable state variables, s_{at} and s_{bt} , which can be modelled with the following bivariate two-state Markov-switching specification

$$\begin{pmatrix} y_{at} \\ y_{bt} \end{pmatrix} = \begin{pmatrix} \mu_{a0} + \mu_{a1}s_{at} \\ \mu_{b0} + \mu_{b1}s_{bt} \end{pmatrix} + \begin{pmatrix} \mathcal{E}_{at} \\ \mathcal{E}_{bt} \end{pmatrix}, \quad (4)$$

where

$$\begin{pmatrix} \mathcal{E}_{at} \\ \mathcal{E}_{bt} \end{pmatrix} \sim N \left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_a^2 & \sigma_{ab} \\ \sigma_{ab} & \sigma_b^2 \end{pmatrix} \right], \quad (5)$$

As in the univariate case, s_{at} and s_{bt} evolve according to an irreducible two-state Markov chain, whose transition probabilities are given by

$$p(s_{kt} = j | s_{kt-1} = i) = p_{k,ij}, \quad (6)$$

for $i, j = 0, 1$ and $k = a, b$.

If the state variable $s_{k,t} = 0$, the confidence index of country k is in regime 0 with mean equal to $\mu_{k,0}$, while if $s_{k,t} = 1$, the index is in regime 1 with mean equal to $\mu_{k,0} + \mu_{k,1}$. If we assume $\mu_{k,1} > 0$, the latent variable $s_{k,t}$ identifies periods of *low* and *high* economic sentiment performance.

In order to summarize the information about the relationship of dependency between the latent variables, we define another latent variable v_{abt} . This variable is equal to 1 if the consumer confidence cycle phases of countries a and b are in a fully synchronised regime at time t , and 0 otherwise. The former implies that $s_{at} = s_{bt} = s_t$, and

$$p(s_{at} = j, s_{bt} = i) = p(s_t = j) \quad (6)$$

By contrast, if s_{at} and s_{bt} exhibit fully independent dynamics, $v_{abt} = 0$ and

$$p(s_{at} = j, s_{bt} = i) = p(s_{at} = j) p(s_{bt} = i) \quad (7)$$

To complete the statistical characterization of the model, v_{abt} is also assumed to evolve according to a two-state Markov chain with transition probabilities given by

$$p(v_{abt} = j_v | v_{abt-1} = i_v) = p_{vij}, \quad (8)$$

for $i_v, j_v = 0, 1$.

The potential regimes of the model are summarised by the latent variable s_{abt} for each period of time t . In particular, the different regimes are

$$s_{abt} = \left\{ \begin{array}{l} 1, \text{ if } s_{at} = 0, s_{bt} = 0, \text{ and } v_{abt} = 0 \\ 2, \text{ if } s_{at} = 0, s_{bt} = 1, \text{ and } v_{abt} = 0 \\ 3, \text{ if } s_{at} = 1, s_{bt} = 0, \text{ and } v_{abt} = 0 \\ 4, \text{ if } s_{at} = 1, s_{bt} = 1, \text{ and } v_{abt} = 0 \\ 5, \text{ if } s_{at} = 0, s_{bt} = 0, \text{ and } v_{abt} = 1 \\ 6, \text{ if } s_{at} = 0, s_{bt} = 1, \text{ and } v_{abt} = 1 \\ 7, \text{ if } s_{at} = 1, s_{bt} = 0, \text{ and } v_{abt} = 1 \\ 8, \text{ if } s_{at} = 1, s_{bt} = 1, \text{ and } v_{abt} = 1 \end{array} \right. \quad (9)$$

Finally, the joint dynamic of s_{at} and s_{bt} is described by a weighted average between the fully synchronised and fully independent scenarios as follows:

$$p(s_{at} = j_a, s_{bt} = j_b) = p(v_{abt} = 1) p(s_t = j_a) + [1 - p(v_{abt} = 1)] p(s_{at} = j_a) p(s_{bt} = j_b), \quad (10)$$

where $p(v_{abt} = 1) = \delta_{abt}$ measures the dynamic synchronicity between s_{at} and s_{bt} and determines the weights attributed to each scenario.⁵

5: Leiva-León (2017) describes a Bayesian method to estimate the model parameters and to compute inferences on the state variables.

Therefore, in our application, δ_{abt} quantifies the evolution on the degree of synchronisation between the consumer confidence cycles of any two LatAm countries a and b along the sample period. The overall evolution of the averaged pairwise synchronisation is examined in Figure 3. The figure shows that the averaged pairwise distance, $\frac{1}{R} \sum_{a=1}^N \sum_{b>a}^N \delta_{abt}$, where $R = (N^2 - N)/2$ refers to the number of pairwise comparisons, is relatively stable throughout the sample period.

However, the pairwise synchronisation exhibits a high degree of heterogeneity across countries. Table 3 examines this heterogeneity by computing the average of the pairwise distances in consumer confidence synchronisation across LatAm countries. On average, the confidence cycles in Argentina are mostly synchronised with those of Chile, Colombia and Mexico, while the synchronisation falls significantly with Brazil and, to a lesser extent, with Peru. The Brazilian consumers are highly synchronised with the Colombians, with the latter also highly aligned with the Chileans.

4.2. Latest-available pairwise synchronisation

A glimpse of the confidence cycle linkages across LatAm in the last month of the sample, 2017.02, can be obtained by computing $\delta_{ab\ 2017.02}$, for all country pairs a and b . Since these figures can be viewed as the likelihood of perfect pairwise synchronisation, the matrix whose entries are $1 - \delta_{ab\ 2017.02}$ provides insights on the averaged confidence regime distances among countries. Since there are many such measures, Figure 4 reports the multi-dimensional scaling map of those distances.

Notably, the countries that exhibited higher likelihood of being in the low confidence regime in 2017.02 —Brazil, Mexico, Chile and Colombia— stick together in the map and form a cluster of countries that experienced the highest degree of synchronisation. According to Figure A1, the confidence regime in those countries switches from high to low level during 2013-14 and remains in the low level from then onward. For this reason, Figure A2 shows that the pairwise probability of perfect synchronisation across these groups of countries increased sharply around these years.

However, the map also shows two countries, namely Peru, and to a lesser extent Argentina, that appeared in a peripheral zone. This indicates that, in 2017.02, these countries do not seem to be closely related to the core in terms of confidence cycle synchronisation. The diverging inferences in these countries' consumer confidence regimes can explain the location of these countries on the map.

In the case of Argentina, although this country shows a switch from the high confidence to the low confidence state in 2015 —as shown by the countries in the core—, the surge in the Argentinean index in 2017 pushed the regime back to the optimistic state, which implies a desynchronization with the countries in the core. Finally, Peru is the country with the most desynchronised confidence state during the last months of the sample. According to Figure A1, Peru is in the high mood regime from 2009 on, and subsequently loses synchronization with the rest of LatAm countries, as shown in Figure A2.

4.3. Evolution of pairwise synchronisation

Although interesting, the mapped results based on the latest available measures of consumer confidence regime synchronisation do not help to understand how mood linkages across countries have evolved over time. To address this issue, the pairwise probabilities of cycle dependence δ_{abt} for all countries a, b , are collected for all periods t . Accordingly, as the multi-dimensional scaling maps are calculated for each month of the sample, the maps are converted into animated videos that allow both easy identification of which countries manifested the first signs of phase changes and examination of how the interconnections among countries propagate confidence shocks.⁶

Of the 168 time-varying multi-dimensional scaling maps that can be drawn in our sample period, we select some representative maps by looking at the periods of a low confidence regime at a supranational level. As Figure 3 describes, we detected three periods of low confidence in LatAm: 1998.07-2003.10, 2008.04-2009.09, and 2014.05-2017.02.

At the beginning of the sample, all countries except Mexico exhibited high probability of the pessimistic state. The representative map of this period is reported in Panel A of Figure 5, which plots synchronisation distances across countries in 2002.06. As expected, Mexico appeared away from the core of countries that shared the low-confidence regime in this period.

In line with the analysis developed in Section 3, Table 2 revealed that Argentina switched first to the optimistic regime in the early 2003. Thus, Argentina appears drifting towards Mexico in the map that represents the distances in 2003.05 —Panel B of Figure 5—, whose consumers already were in an optimistic mood, while the other countries remained in the core formed by pessimistic consumers. The sequence follows with the map of distances in 2003.12, which shows how Chilean and Colombian consumers shifted towards an optimistic attitude, closing the distance gap with Argentina and Mexico —Panel C of Figure 5. Finally, the map of distances in 2004.09 shows that the only country which remained in the pessimistic regime was Peru —Panel D of Figure 5. Again, according to Table 2, this country switched to the optimistic regime with a lag of 27 months.

The second period of low confidence started in 2008.04 and ended in 2009.09. This period is quite interesting because it refers to the Great Recession. During this period all the countries barring Brazil show a high probability of the pessimistic regime. Thus, Brazil remained in the optimistic regime and did not switch to the pessimistic regime until 2014. This country is therefore plotted mostly away from the rest of the countries in the multidimensional scaling maps of the whole period.

During this period, the first country that showed the turning point towards pessimism in LatAm was Chile. For this reason, Chile appears in the map of distances in 2007.12 —Panel A of Figure 6— as drifting away from its historically most synchronised partners, Colombia and Argentina. The Chilean shift to the pessimistic regime was followed by also leading

6: The full-animated graphs for this paper can be found at <http://www.um.es/econometria/Maximo>.

consumers in Peru and Argentina, which in 2008.08 —Panel B of Figure 6— have already narrowed their distance with Chile on the map. In this plot, Colombia remained isolated, showing resilient consumer optimism until 2008.10, when it finally got dragged by the pessimistic mood of its fellow LatAm countries.

According to Table 2, the peak of low confidence which started in 2008.04 was led by Chile and Peru, which appear synchronised with each other but desynchronised with the other countries on the map of distances at 2009.09 —Panel C of Figure 6. Then, after one year, the map of distances at 2010.09 —Panel D of Figure 6— reveals that all the countries but Mexico, which shifted to a depress mood with a lag of 29 months, to be grouping together.

The third period of low confidence started in 2014.05 and lasted until the end of the sample in 2017.02. In this period, Peru is the only odd man out, since it remained in the high-confidence regime from 2009. Argentina and Mexico are the two countries leading the transition towards a low confidence peak, which explains why these countries already appear together but away from the rest of LatAm countries on the map of distances in 2014.01 —Panel A of Figure 7. These countries stay together in the multidimensional scaling maps until the start of 2017, when Argentina shifted from the pessimistic to the optimistic regime as of 2017.04 —as shown in Figure A1. Finally, as depicted in the map of distances in 2016.10 —Panel B of Figure 7—, Argentina moved to the periphery signalling a leading role in a potential new LatAm confidence phase shift towards optimism.

5. Conclusions

The consumer confidence indices measure the tendencies or *spirits* that consumers are expressing through their saving and spending decisions. We find that the dynamics of these indices can be split into two distinct regimes. In one regime, consumers spend money, indicating a healthy economy, while lifting consumer confidence. In the other regime, the mood is trending down; consumers are saving more while spending less, indicating an economy in trouble.

We use a comprehensive methodology to characterise the confidence cycle dynamics across LatAm economies, always “*allowing the data to speak*”. Regarding the different features of confidence boom and bust cycle in the region, we conclude that, in general terms, during the last decades Argentina, Chile, Colombia and Mexico tend to share features that are more common in their consumers’ mood cycles than in those of Brazil and Peru.

In terms of synchronisation, although we show that the averaged pairwise measures of synchronisations remain relatively stable in the latter years —which suggests some degree of aggregate homogeneity—, disaggregation of country pair measures shows a high level of both heterogeneity and dynamic variation. In the first period of LatAm low confidence, 1998.07-2003.11, Argentina and Chile played a leading role in the recovery process. In the second period of pessimism, 2008.04-2009.09, Argentina and Chile were clearly followed by the other countries in determining the peak in low confidence, while pessimism was abandoned early by consumers of Peru and Chile. Finally, Argentina and Mexico are the countries with the most prominent leading behaviour in the 2014.05 peak of low mood. Notably, Argentina showed a deterioration in synchronisation at the end of 2016, which could signal a new LatAm trough of confidence if Argentina plays its leading role in mood shifts again, this time towards optimism.

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Table 1 Characteristics of consumer confidence indices and Markov-switching estimates

	Argentina	Brazil	Chile	Colombia	Mexico	Peru
Sample	1998.07 2017.05	1994.06 2017.03	1981.03 2017.05	2011.11 2017.04	2001.03 2017.05	2003.05 2017.03
Mean	46.08	119.82	46.52	14.37	39.50	48.92
Mean in high regime	52.3 (0.5)	144.0 (1.2)	61.0 (1.0)	22.4 (0.8)	44.6 (0.2)	52.8 (0.3)
P₀₀	0.96 (0.02)	0.99 (0.01)	0.98 (0.01)	0.98 (0.01)	0.97 (0.01)	0.99 (0.01)
Mean in low regime	40.9 (0.4)	101.6 (1.0)	27.5 (1.2)	-1.9 (1.2)	36.9 (0.2)	39.9 (0.5)
P₁₁	0.96 (0.02)	0.99 (0.01)	0.98 (0.01)	0.96 (0.02)	0.98 (0.01)	0.96 (0.03)
Expected duration of high regimes	23	111	60	59	49	110
Expected durations of low regimes	27	160	60	29	75	24
Frequency of high regimes	5	1	4	2	2	2
Frequency of low regimes	5	2	4	3	2	2
Deepness of low relative to high regime (%)	21.8	29.4	54.9	108.5	17.3	24.4

Notes: Parameter p₀₀ (p₁₁) measures the probability that a high (low) regime continues. Expected durations are given in months. Frequency refers to the number of regimes. The standard deviations are shown in brackets.

Table 2 Lead and lag patterns with respect to LatAm turning points of low confidence

	Trough since November 2003	Peak since April 2008	Trough since October 2009	Peak since May 2014	Average in troughs	Average in peaks	Overall average
Argentina	+6	+1	-7	+27	-1	+14	+7
Brazil	-10	N/A	N/A	+1	-10	+1	-5
Chile	+2	+8	+2	-4	+2	+2	+2
Colombia	-1	-6	-3	-14	-2	-10	-6
Mexico	N/A	-1	-29	+7	-29	+3	-8
Peru	-27	+1	+3	N/A	-12	+1	-8

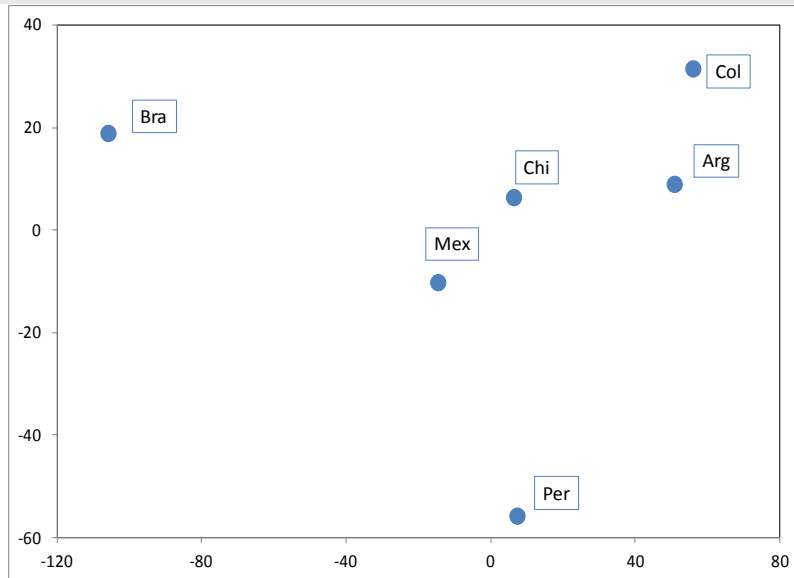
Notes: Positive (negative) figures refer to months in advance (late). N/A observations are for countries that do not share the corresponding LatAm turning point.

Table 3 Averaged pairwise likelihood of perfect regime synchronisation

	Argentina	Brazil	Chile	Colombia	Mexico	Peru
Argentina	-	-	-	-	-	-
Brazil	0.10 (0.08)	-	-	-	-	-
Chile	0.30 (0.19)	0.20 (0.17)	-	-	-	-
Colombia	0.22 (0.18)	0.48 (0.15)	0.48 (0.14)	-	-	-
Mexico	0.19 (0.16)	0.14 (0.11)	0.14 (0.11)	0.13 (0.12)	-	-
Peru	0.14 (0.17)	0.15 (0.11)	0.10 (0.08)	0.19 (0.16)	0.07 (0.12)	-
Average	0.19 (0.18)	0.21 (0.18)	0.25 (0.20)	0.30 (0.21)	0.14 (0.13)	0.13 (0.14)

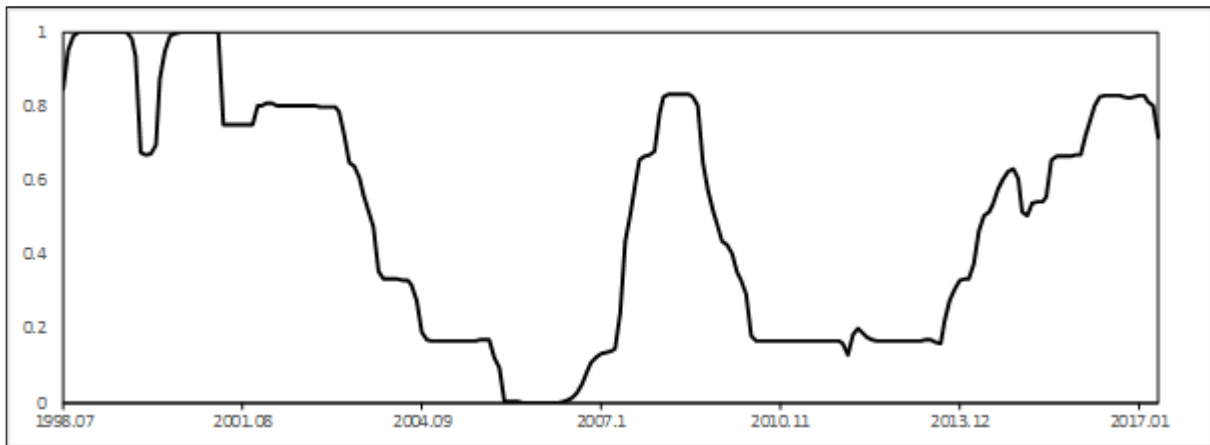
Notes: Entries show the average of the pairwise probability of perfect synchronisation. The standard deviations are shown in brackets.

Figure 1 Multidimensional scaling of consumer confidence characteristics



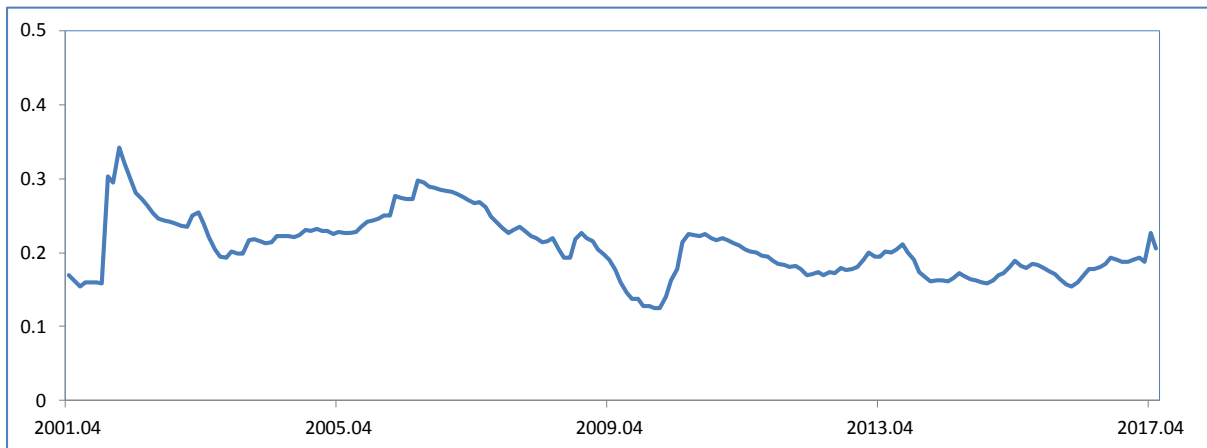
Notes: Multidimensional scaling map based on the Euclidean distance of the business cycle characteristics.

Figure 2 Averaged probability of low confidence regime 1998.07-2017.03



Notes: The figure shows the average smoothed probability of low confidence regime, i.e., $\frac{1}{N} \sum_{a=1}^N P(s_{at} = 1 | \chi_{aT})$, where N is the number of countries in the sample.

Figure 3 Averaged probability of perfect synchronisation



Notes: The figure shows the average smoothed probability of confidence cycle synchronisation, i.e., $\frac{1}{R} \sum_{a=1}^N \sum_{b>a}^N \delta_{abr}$, where $R = (N^2 - N) / 2$ is the number of pairwise comparisons.

Figure 4 Multidimensional scaling of synchronisation measures in 2017.02

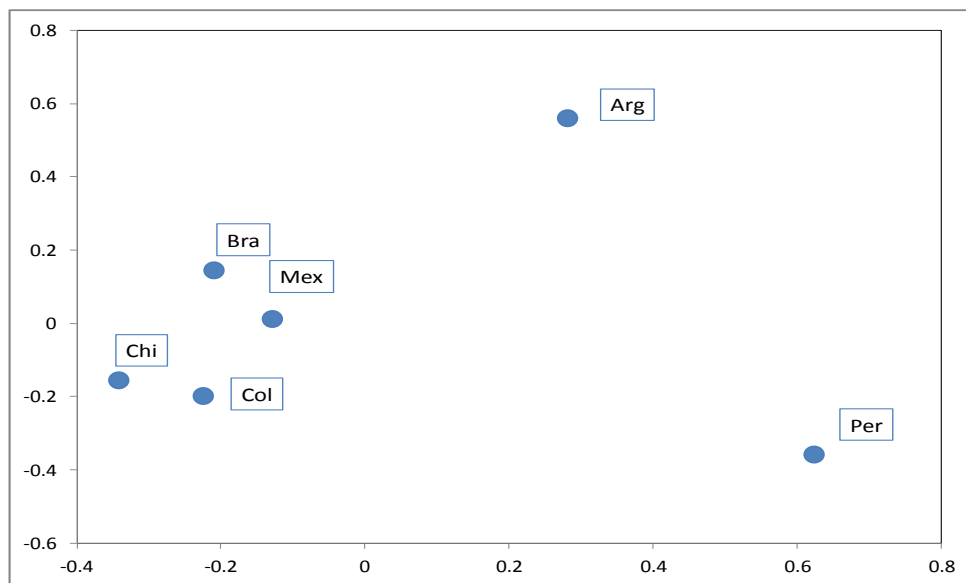


Figure 5 First period of low confidence: 1998.07-2003.11

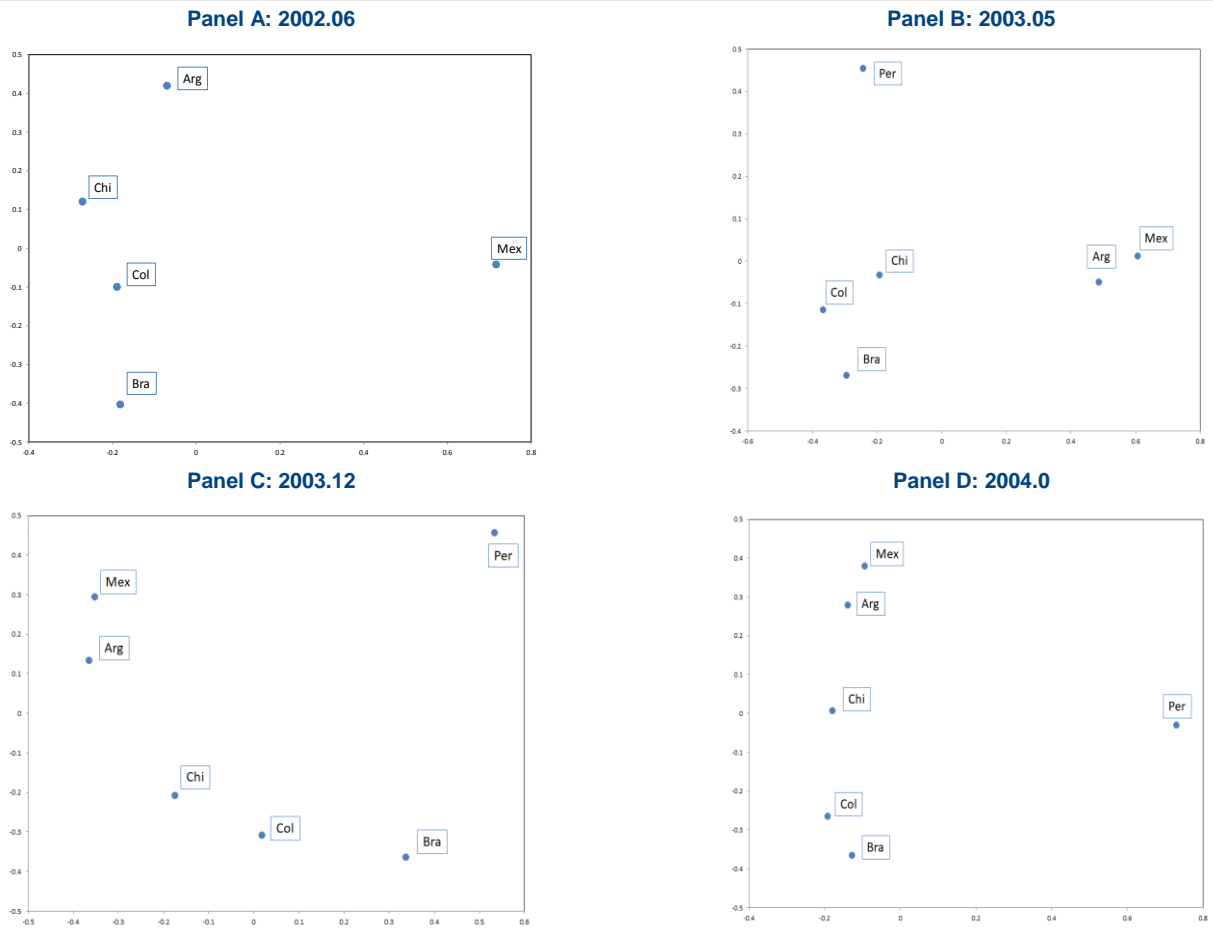
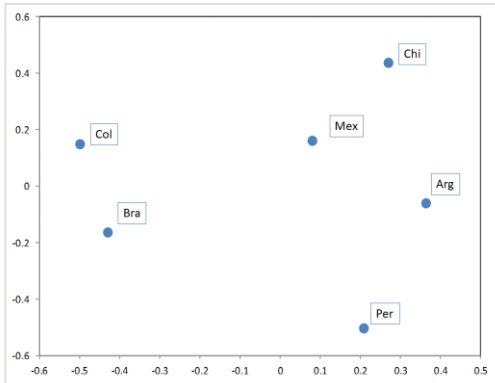
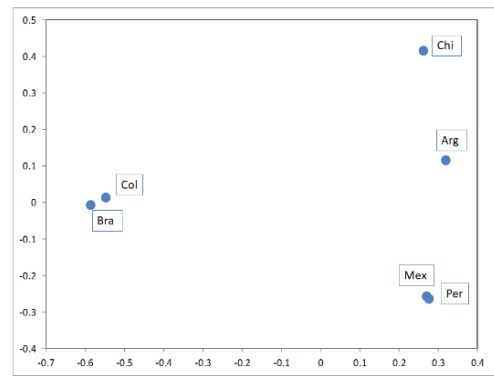


Figure 6 Second period of low confidence: 2008.04-2009.09

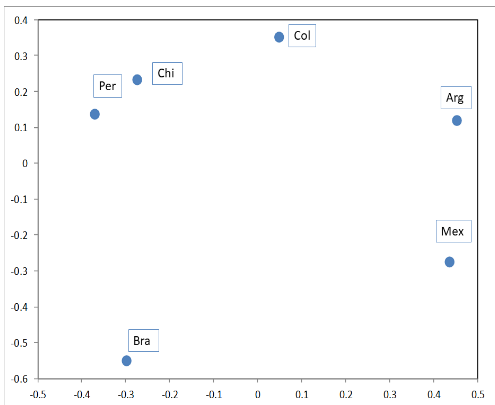
Panel A: 2007.12



Panel B: 2008.08



Panel C: 2009.09



Panel D: 2010.09

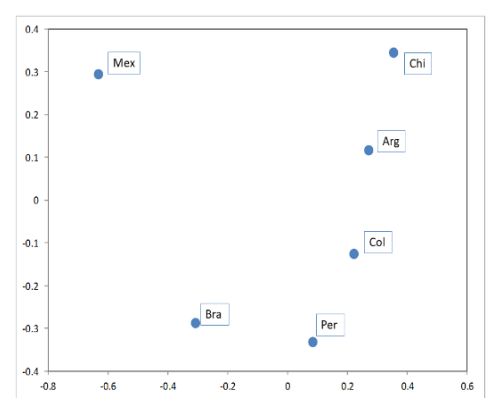
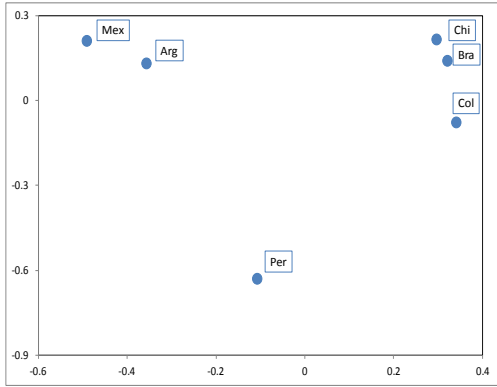
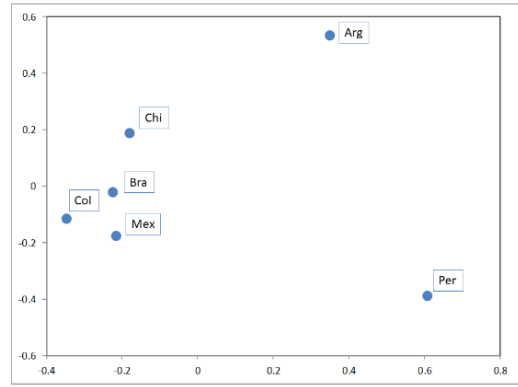


Figure 7 Third period of low confidence: 2014.05-2017.02

Panel A: 2014.01



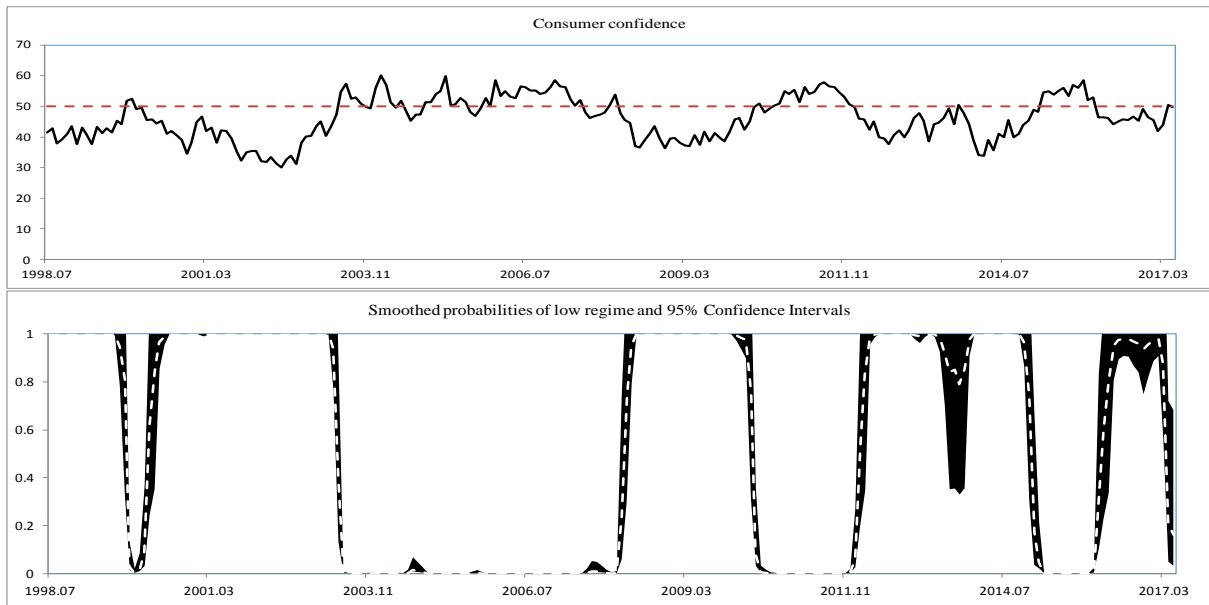
Panel B: 2016.10



Appendix

Figure A1 Consumer confidence: univariate models

Panel 1: Argentina



Panel 2: Brazil

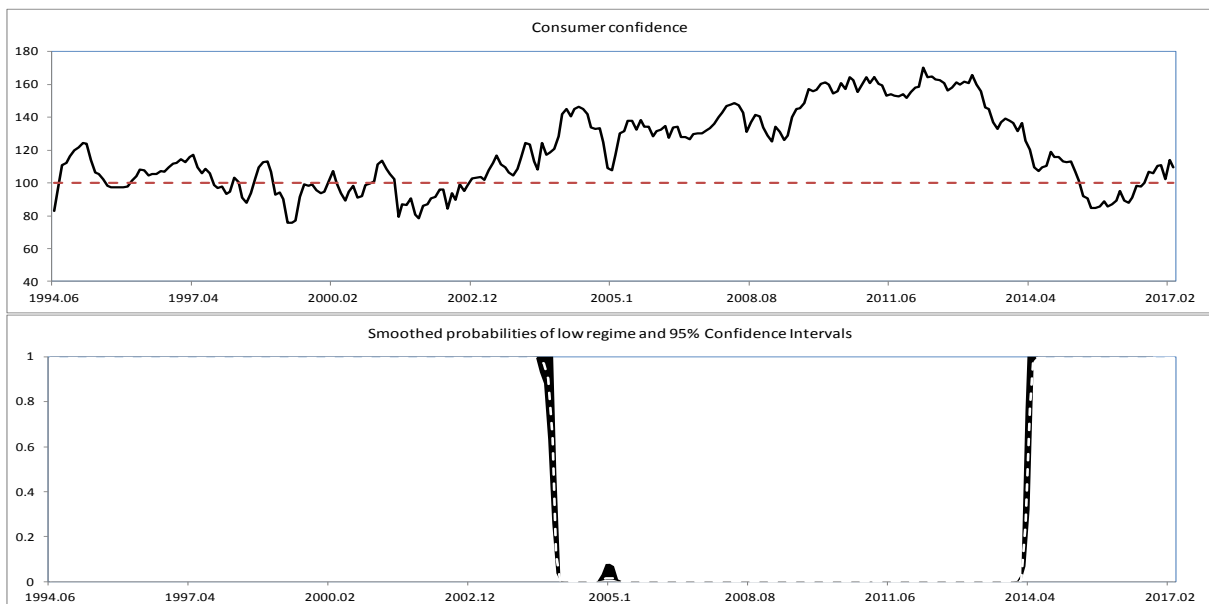
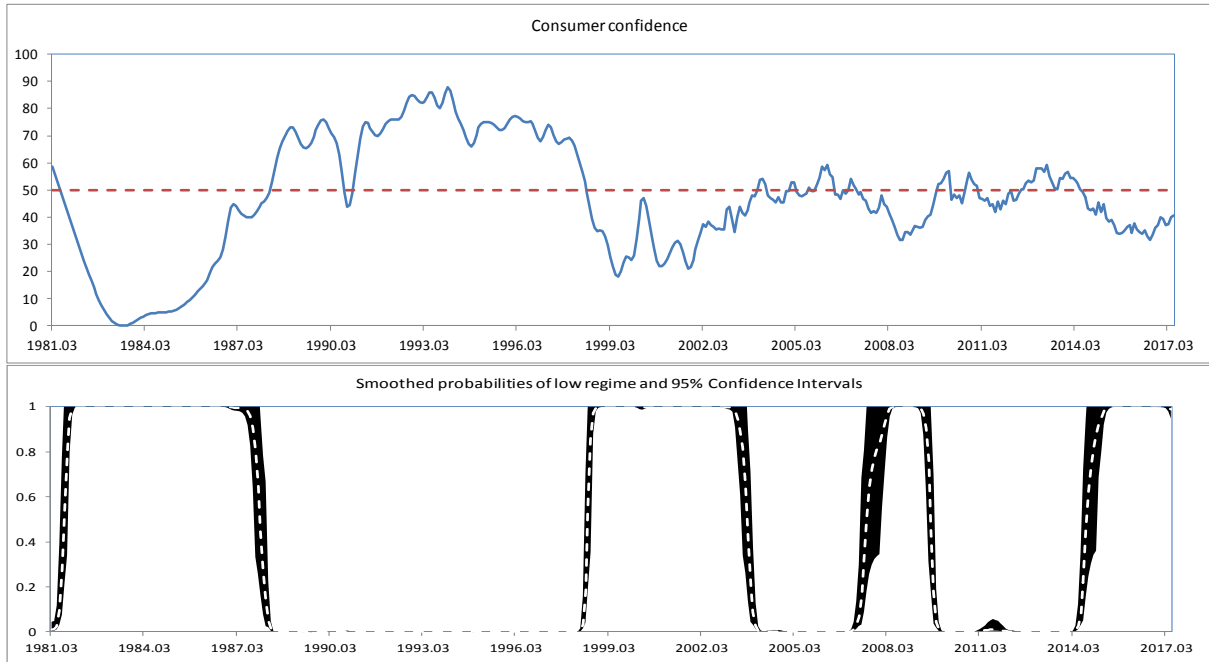


Figure A1 Consumer confidence: univariate models (cont')

Panel 3: Chile



Panel 4: Colombia

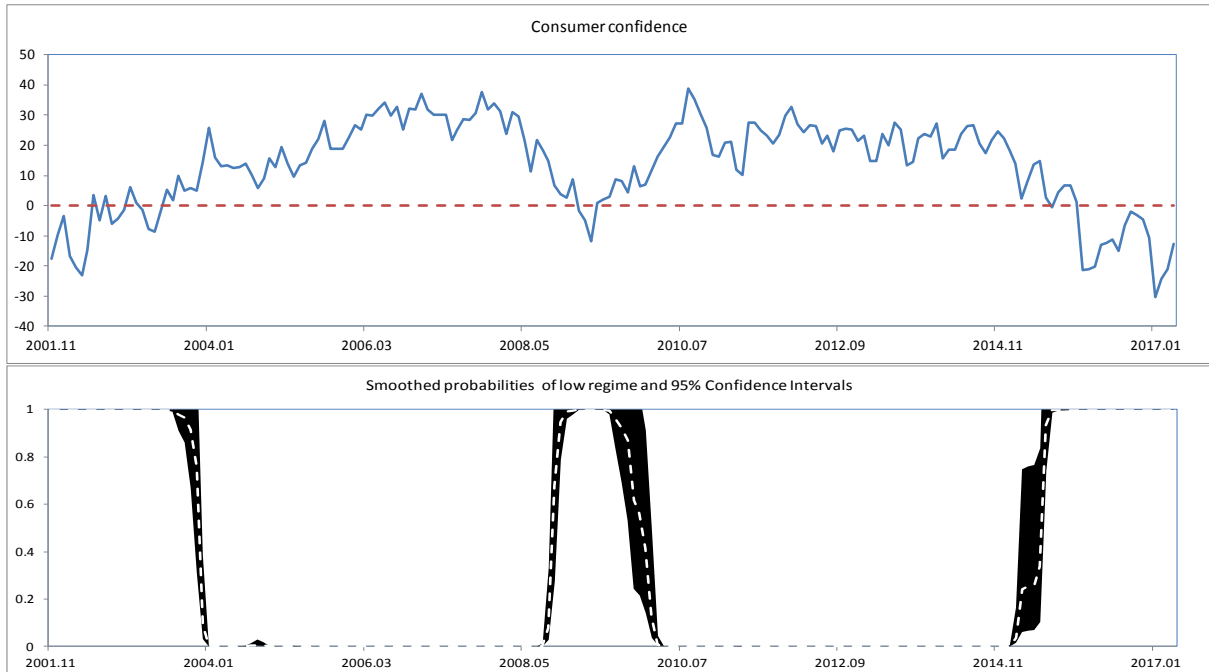
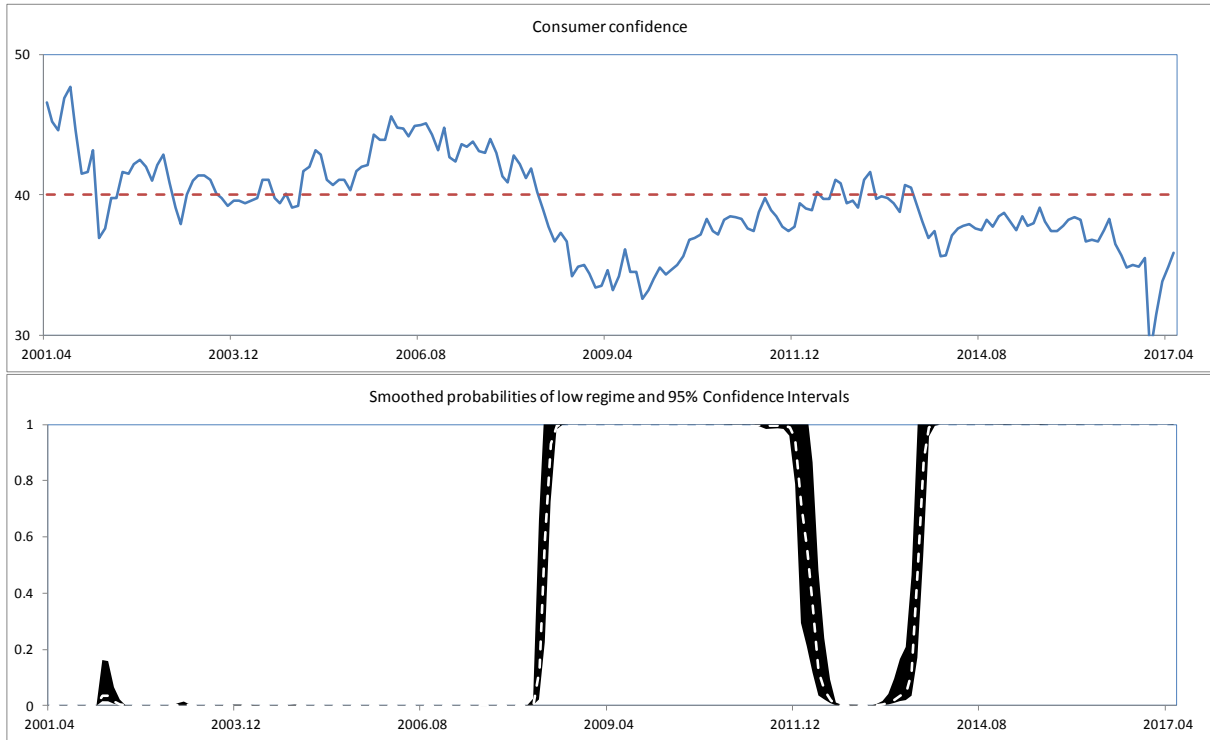


Figure A1 Consumer confidence: univariate models (cont')

Panel 5: Mexico



Panel 6: Peru

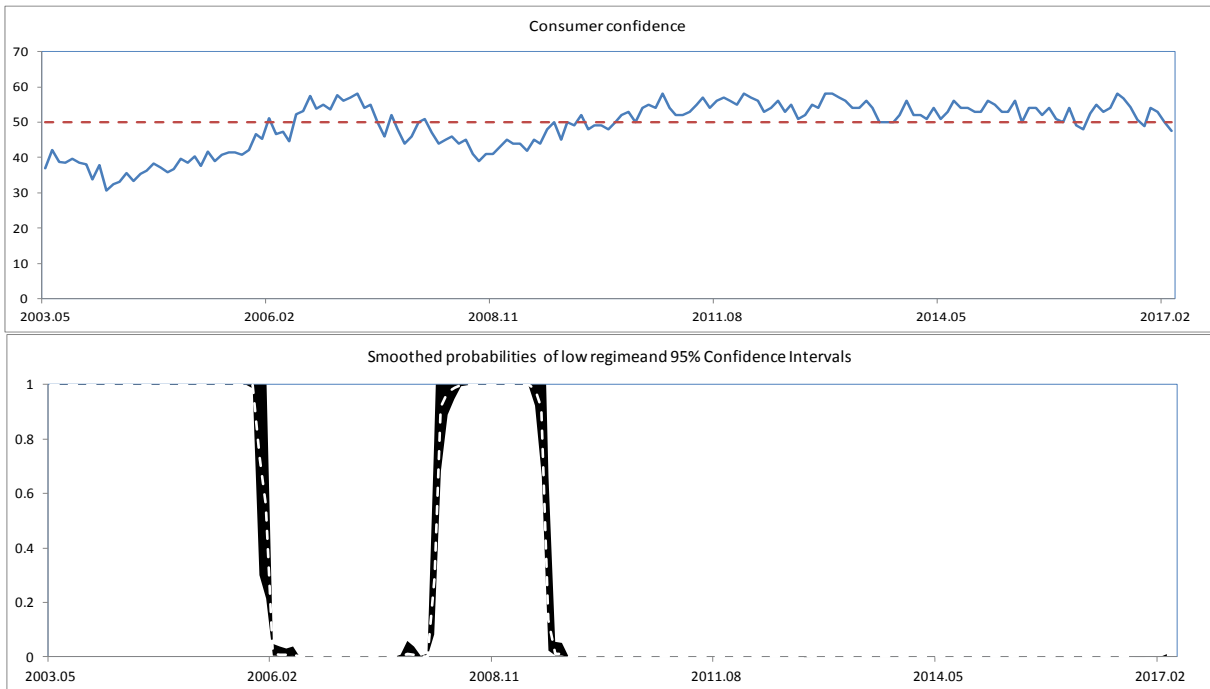


Figure A2 Pairwise probability of perfect synchronisation

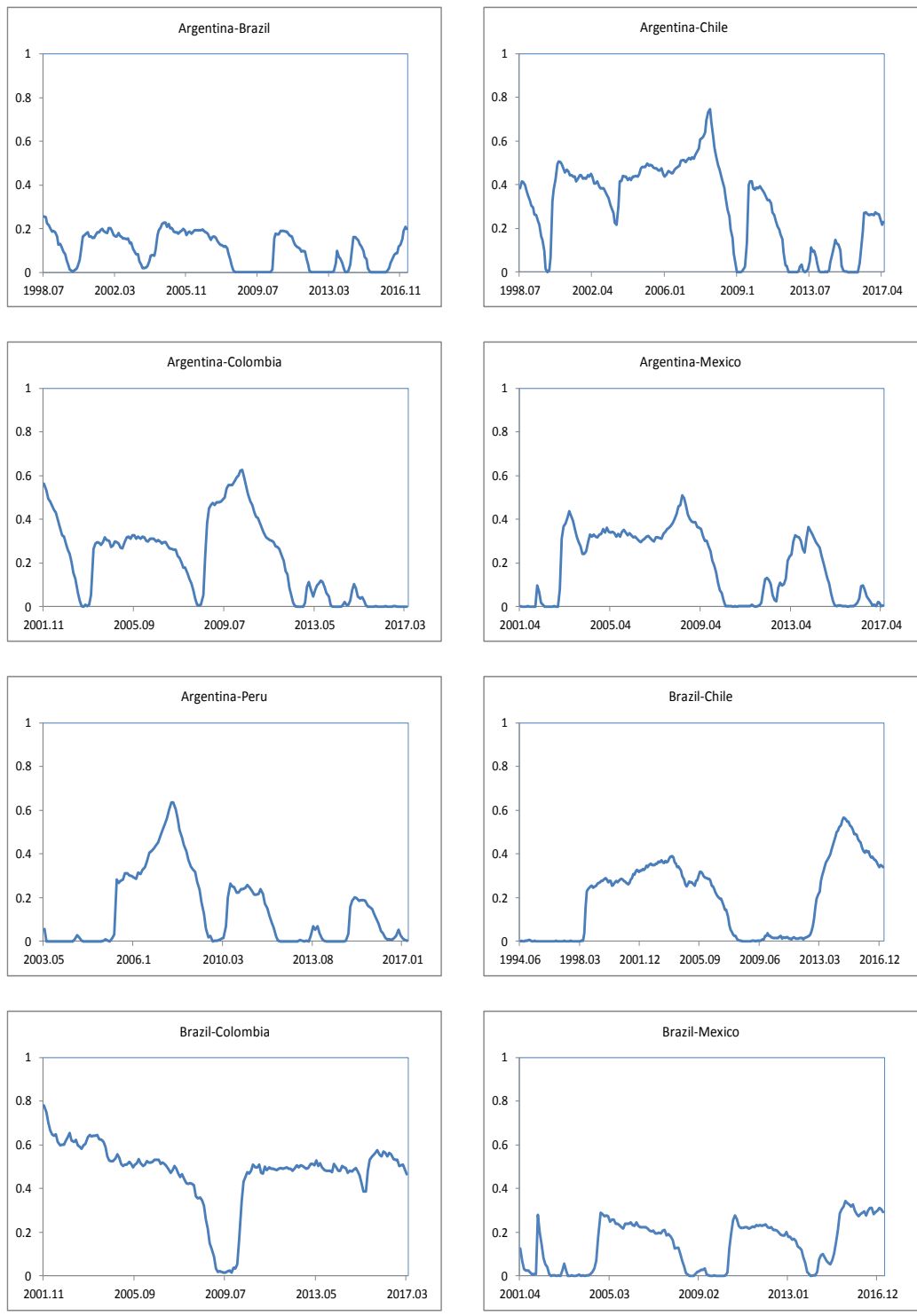
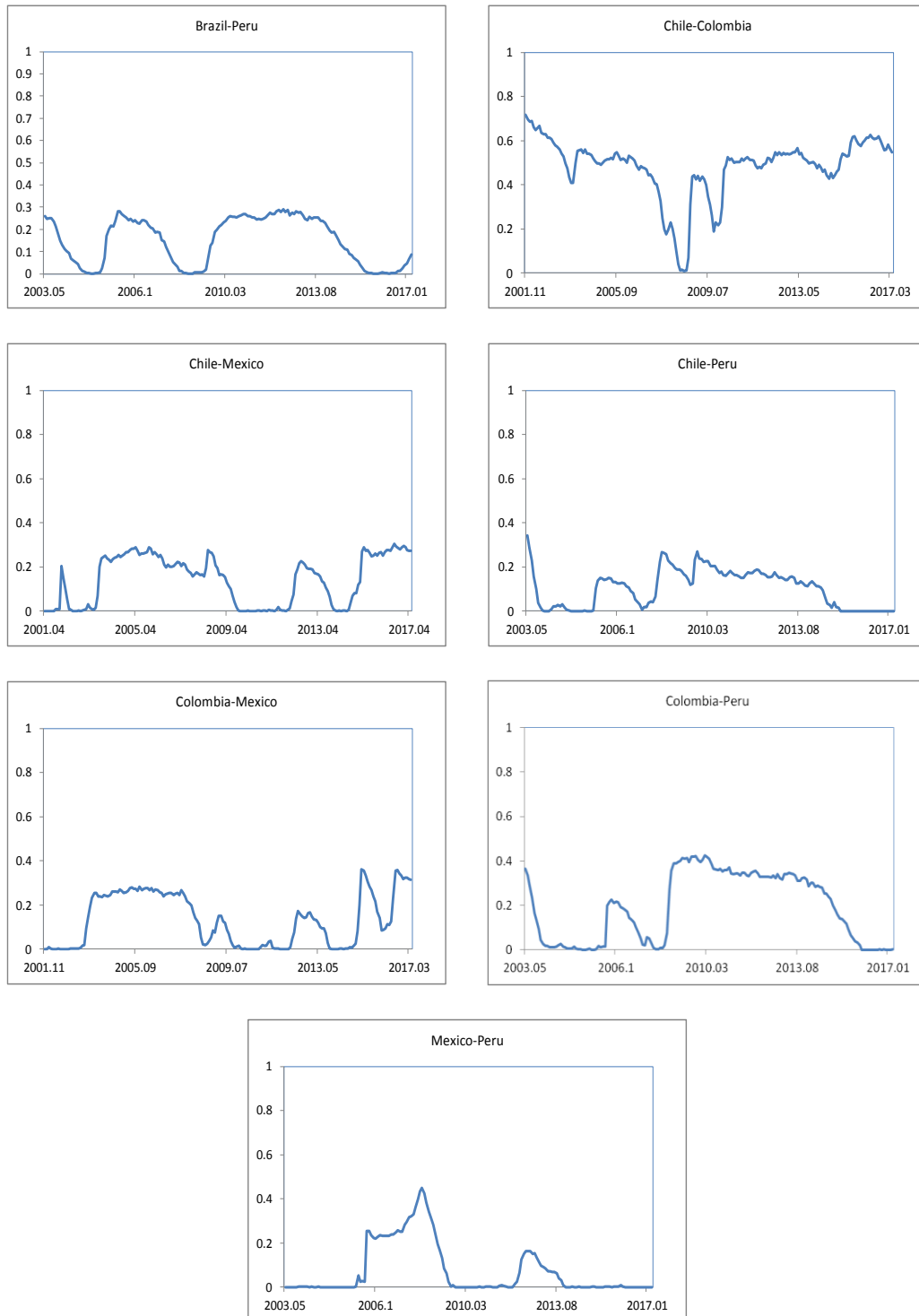


Figure A2 Pairwise probability of perfect synchronisation (cont')



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